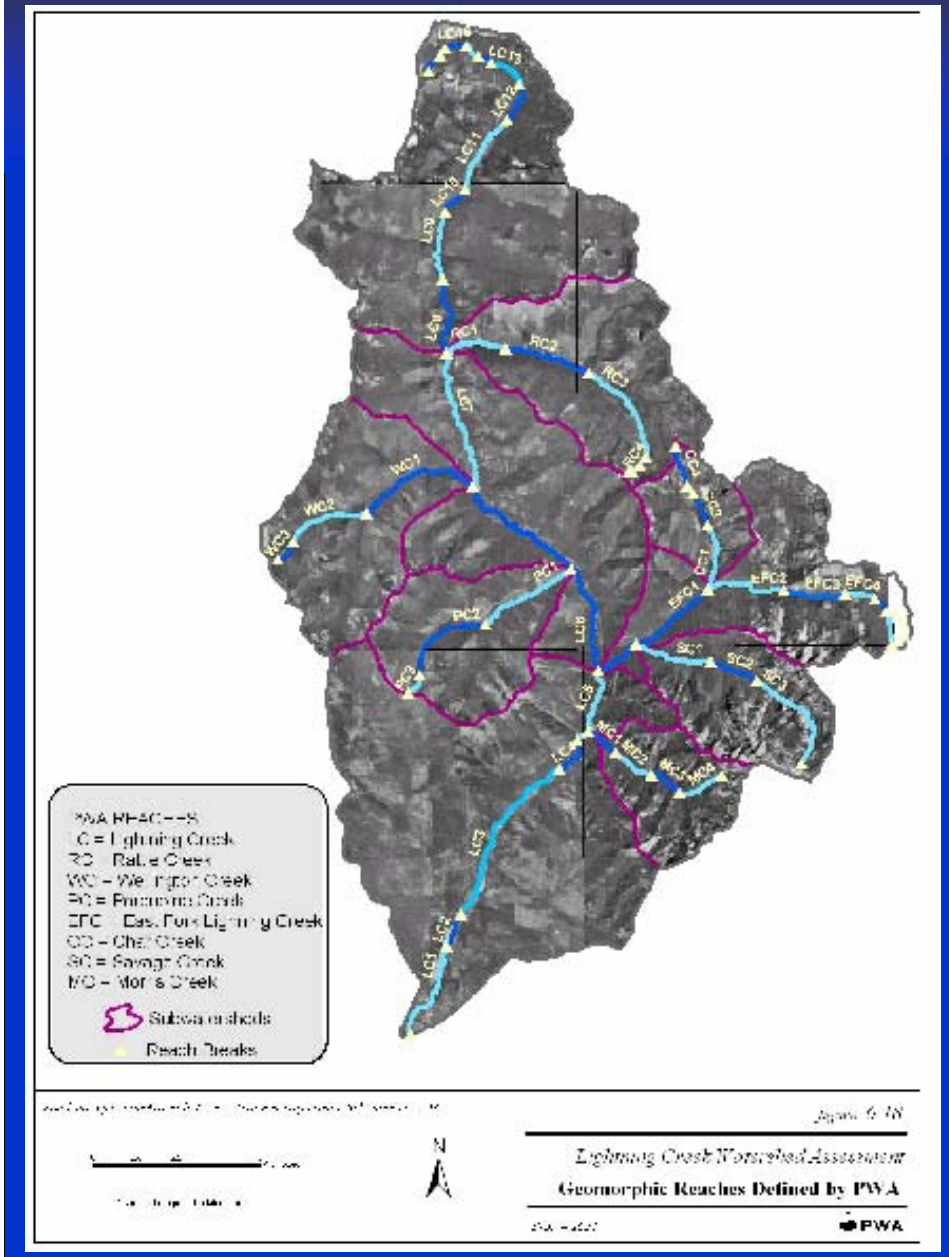
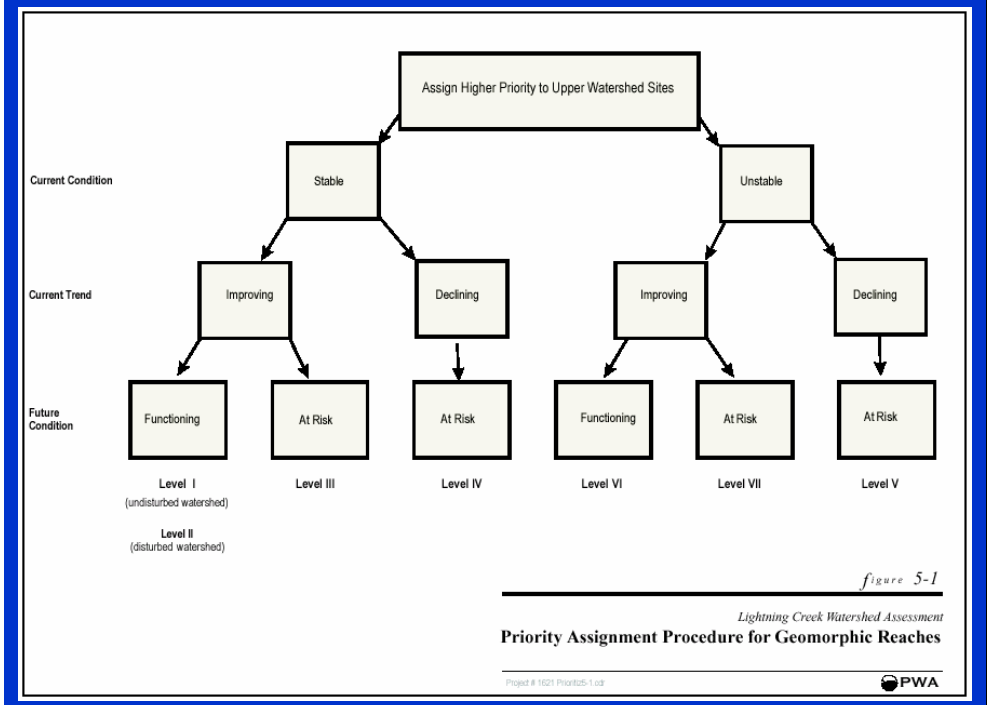
Geomorphic Reach Prioritization





Stream Surveys

Lightning Creek Watershed Assessment
Level II Cross Section Surveys Summary

PWA

Subwatershed: Savage
Stability: Stable (CES Reference Reach)
Drainage Area (km²): 17.0
General Location: Lower Savage Creek
UTM: Northing 5,343,805 Easting 567,485

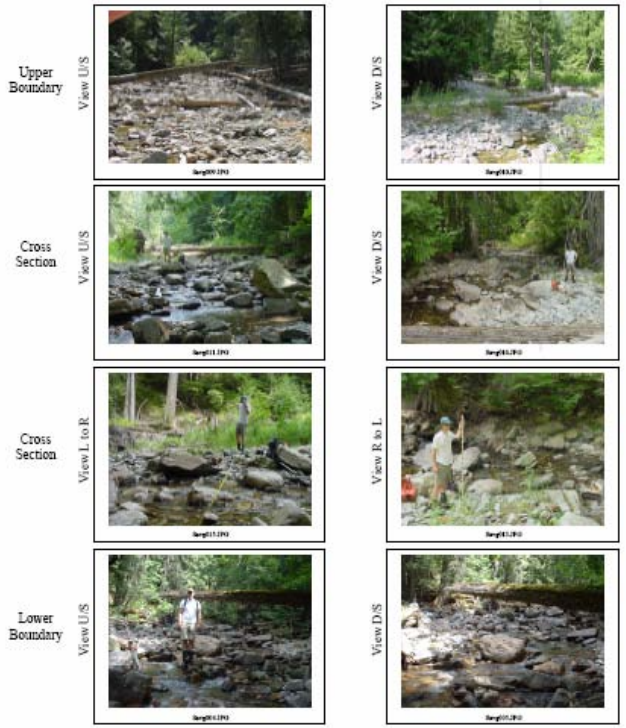
	1997	2001	2002	2003
Crew	CES			PWA
HU or XS #	14			1
Reach #	1			1
Date	8/14/1997			8/1/2003
Area (m²)				4.4
Width (m)	11.7			8.6
Mean depth (m)*	0.27			0.51
Width/depth ratio	42.6			17.0
Max depth (m)	0.52			0.81
Flood prone width (m)	12.6			17.0
Entrenchment ratio	1.1			2.0
D50 (mm)	64 - 128			181
D84 (mm)				386
Percent fines (<6 mm)				6
Slope (field msmt)	0.05			0.047
Sinuosity (map msmt)				1.2
Stream type (M&B)				Plane-bed
Steam type (Rosgen)	B3a			B3a

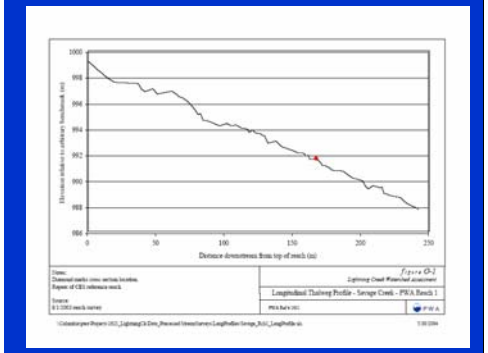
*Average of multiple depth measurements (USFS); average of three depth measurements divided by four (CES); hydraulic mean depth (PWA).

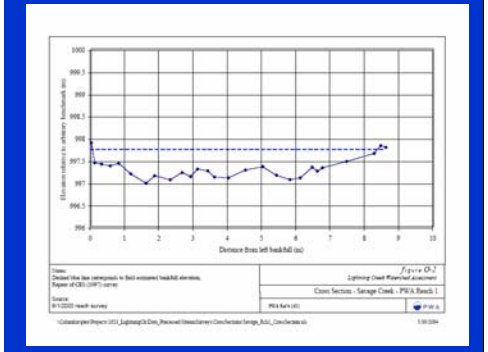
Lightning Creek Watershed Assessment

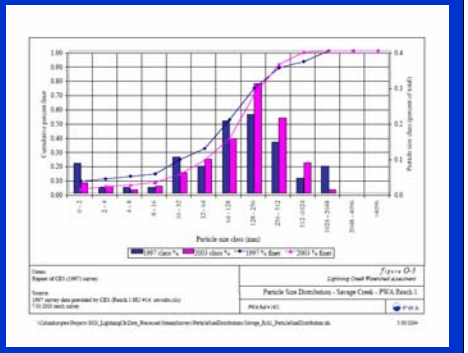
PWA

Savage Reach # 1 XS # 1 Photo Date 8/1/2003 figure O-4



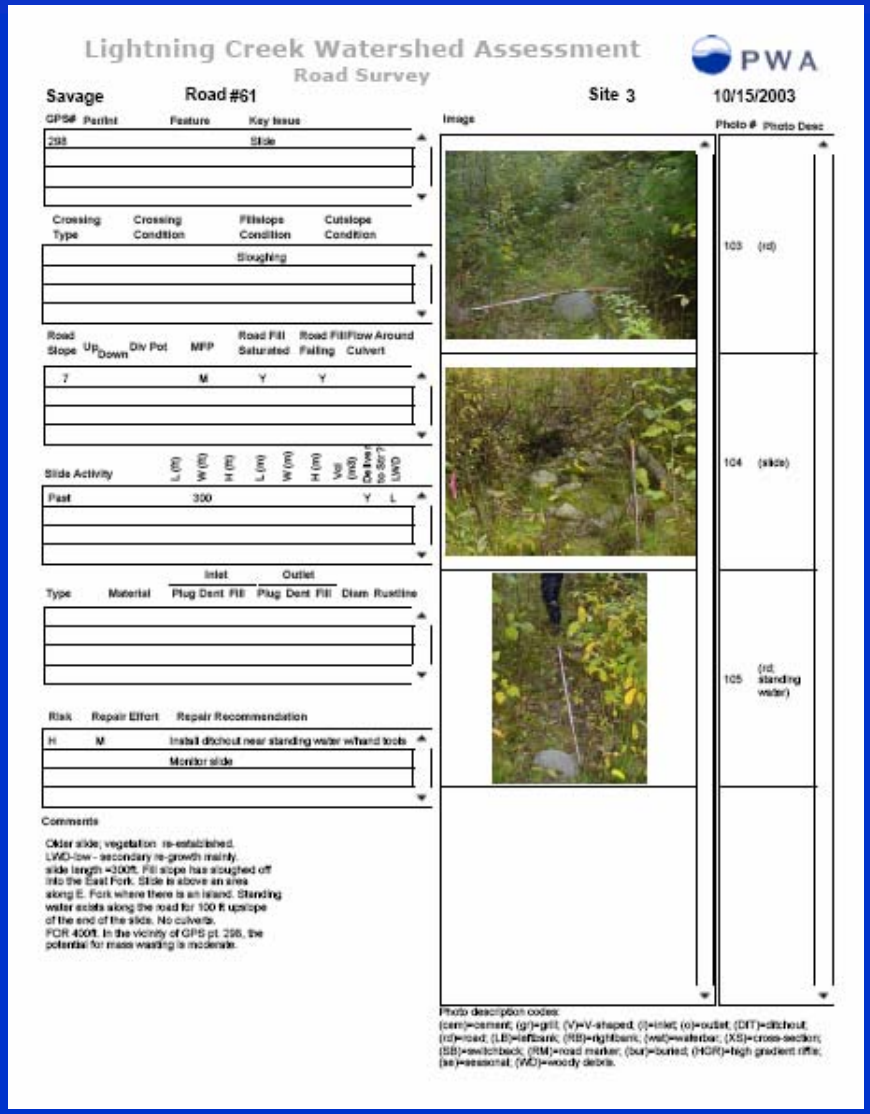






PWA

Abandoned Road Surveys



Lightning Creek Watershed Assessment
Road Survey

PWA

Savage Road #61 Site 3 10/15/2003

GPS#	Point	Feature	Key Issue
298		Slide	

Crossing Type	Crossing Condition	Fillslope Condition	Cutslope Condition
		Sloughing	

Road Slope	Up/Down	Div Pot	MFP	Road Fill Saturated	Road Fill Failing	Flow Around Culvert
7		M		Y	Y	

Slide Activity	L (ft)	W (ft)	H (ft)	L (m)	W (m)	H (m)	Vol (m3)	Deliver to Str?	LWD
Past				300				Y	L

Type	Material	Inlet Plug	Inlet Dent	Inlet Fill	Outlet Plug	Outlet Dent	Outlet Fill	Diam	Rustline

Risk	Repair Effort	Repair Recommendation
H	M	Install ditchout near standing water w/hand tools
		Monitor slide

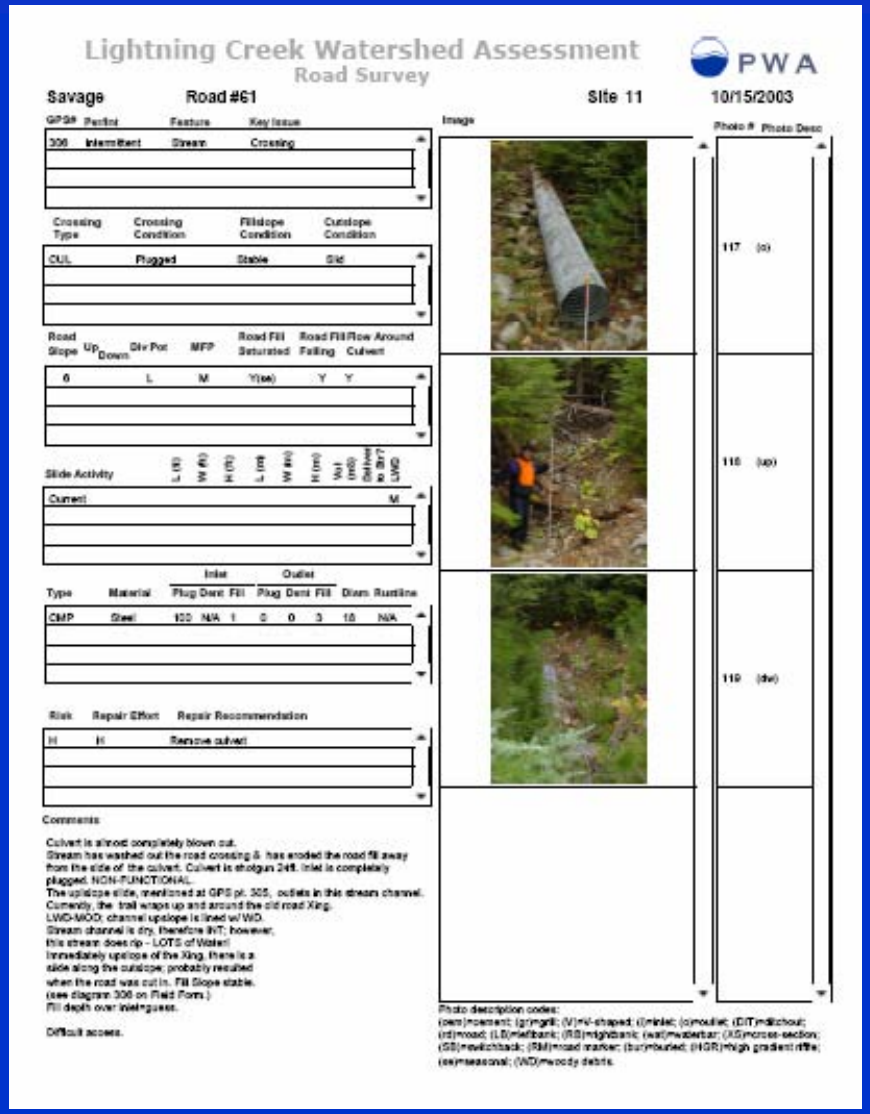
Comments

Older slide; vegetation re-established.
LWD-low - secondary re-growth mainly.
slide length =300ft. Fill slope has sloughed off into the East Fork. Slide is above an area along E. Fork where there is an island. Standing water exists along the road for 100 ft upslope of the end of the slide. No culverts.
FOR 400ft. In the vicinity of GPS pt. 298, the potential for mass wasting is moderate.

Image

Photo #	Photo Desc
103	(rd)
104	(slide)
105	(rd, standing water)

Photo description codes:
(cem)=cement; (gr)=grill; (V)=V-shaped; (i)=inlet; (o)=outlet; (DIT)=ditchout; (rd)=road; (LB)=leftbank; (RB)=rightbank; (wat)=waterbar; (XS)=cross-section; (SB)=switchback; (RM)=road marker; (bur)=buried; (HGR)=high gradient riffle; (se)=seasonal; (WD)=woody debris.



Lightning Creek Watershed Assessment
Road Survey

PWA

Savage Road #61 Site 11 10/15/2003

GPS#	Point	Feature	Key Issue
306	Intermittent	Stream	Crossing

Crossing Type	Crossing Condition	Fillslope Condition	Cutslope Condition
CUL	Plugged	Stable	Std

Road Slope	Up/Down	Div Pot	MFP	Road Fill Saturated	Road Fill Failing	Flow Around Culvert
6		L	M	Y(se)	Y	Y

Slide Activity	L (ft)	W (ft)	H (ft)	L (m)	W (m)	H (m)	Vol (m3)	Deliver to Str?	LWD
Current									M

Type	Material	Inlet Plug	Inlet Dent	Inlet Fill	Outlet Plug	Outlet Dent	Outlet Fill	Diam	Rustline
CMP	Steel	100	N/A	1	0	0	3	18	N/A

Risk	Repair Effort	Repair Recommendation
H	H	Remove culvert

Comments

Culvert is almost completely blown out.
Stream has washed out the road crossing & has eroded the road fill away from the side of the culvert. Culvert is shotgun 24ft. Inlet is completely plugged. NON-FUNCTIONAL.
The upslope slide, mentioned at GPS pt. 305, outlets in this stream channel. Currently, the trail wraps up and around the old road Xing.
LWD-MOD; channel upslope is lined w/ WD.
Stream channel is dry, therefore INT; however, this stream does rip - LOTS of Water!
Immediately upslope of the Xing, there is a slide along the cutslope; probably resulted when the road was cut in. Fill Slope stable.
(see diagram 306 on Field Form.)
Fill depth over inlet=guess.

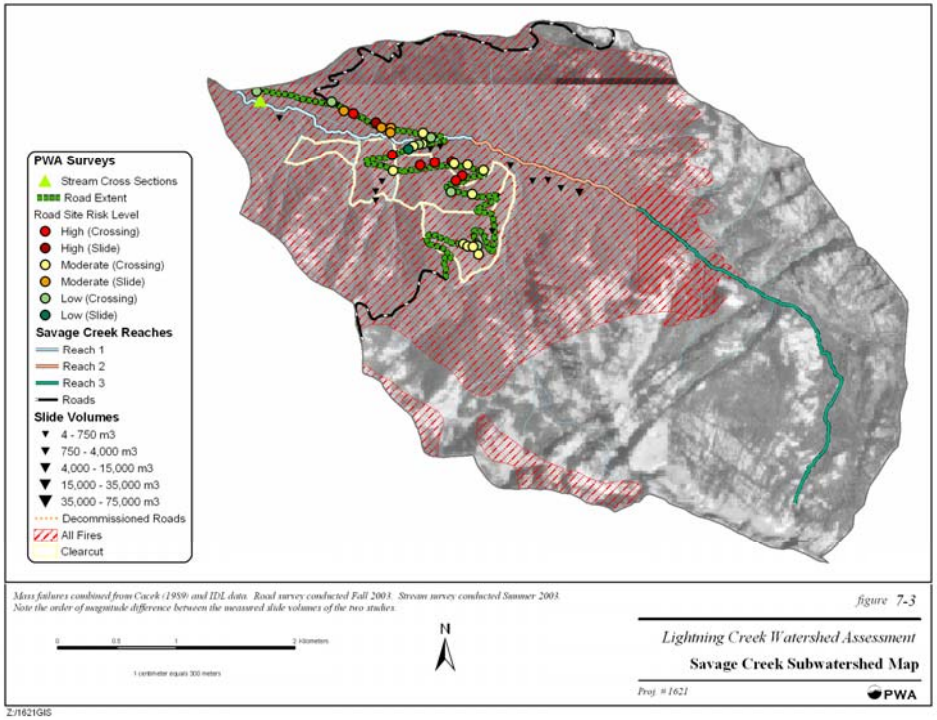
Difficult access.

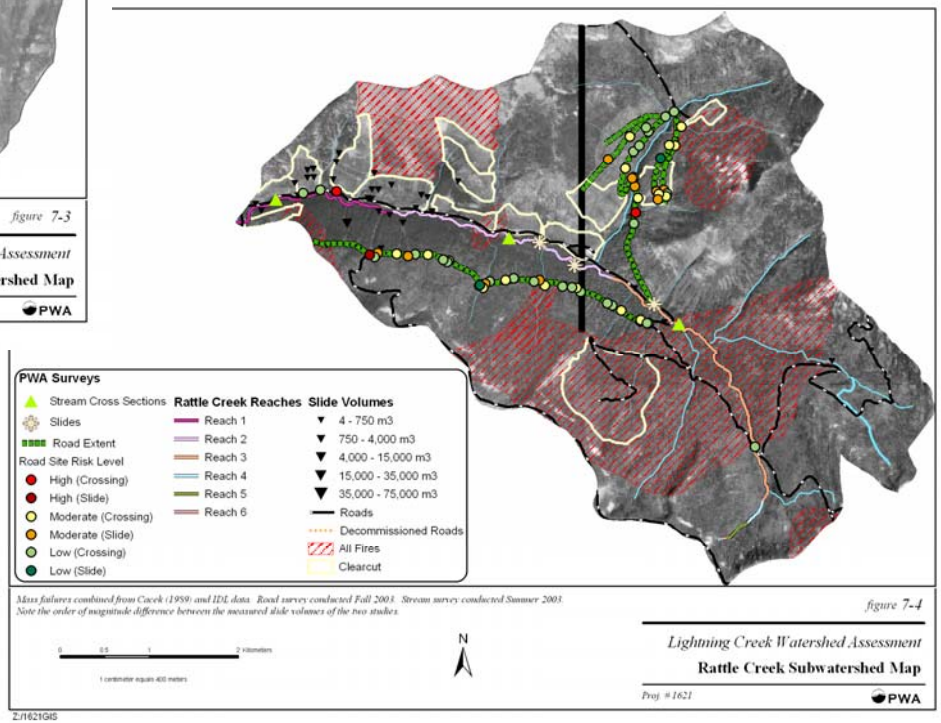
Image

Photo #	Photo Desc
117	(o)
118	(up)
119	(dw)

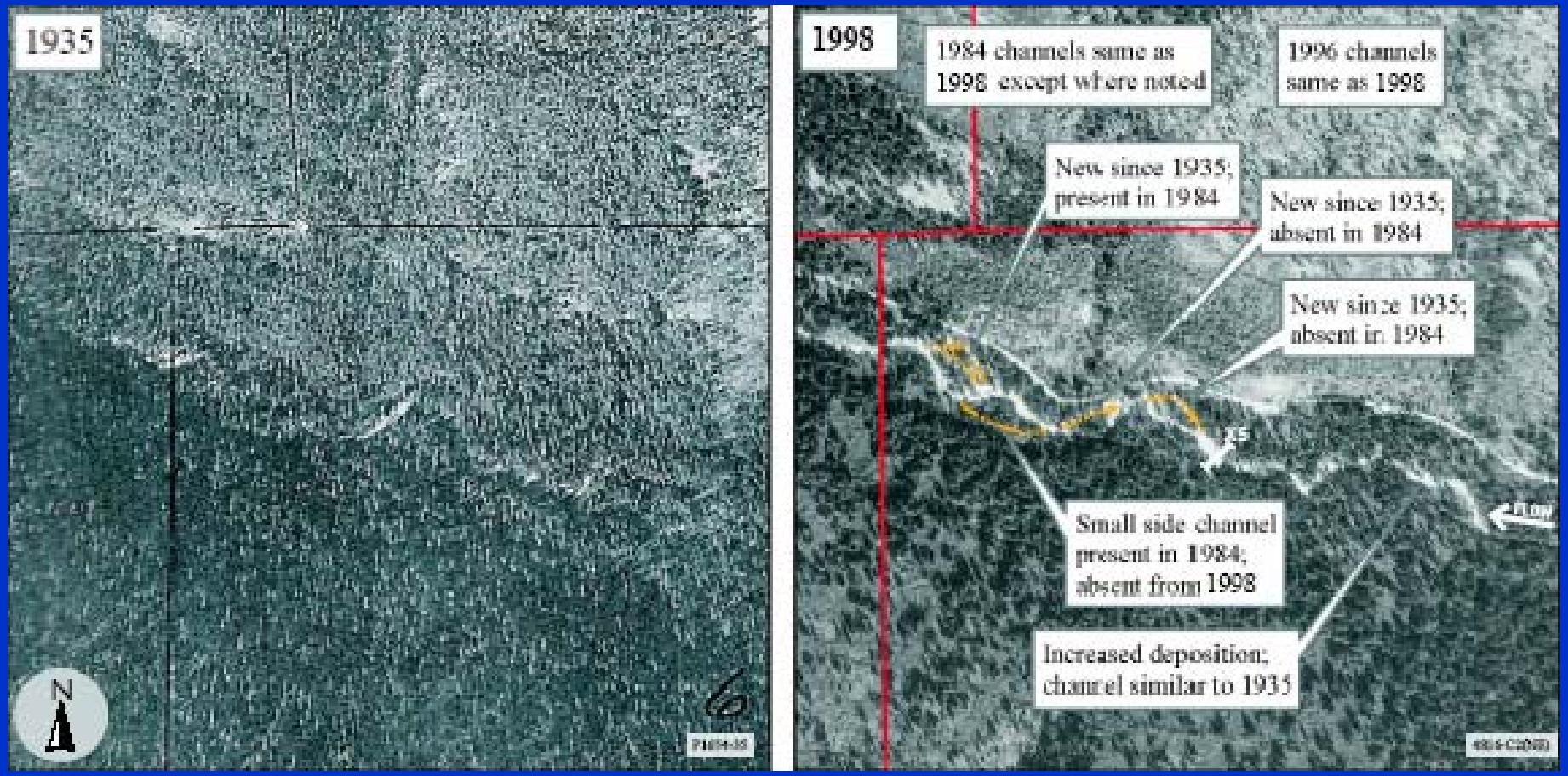
Photo description codes:
(cem)=cement; (gr)=grill; (V)=V-shaped; (i)=inlet; (o)=outlet; (DIT)=ditchout; (rd)=road; (LB)=leftbank; (RB)=rightbank; (wat)=waterbar; (XS)=cross-section; (SB)=switchback; (RM)=road marker; (bur)=buried; (HGR)=high gradient riffle; (se)=seasonal; (WD)=woody debris.

GIS Integration

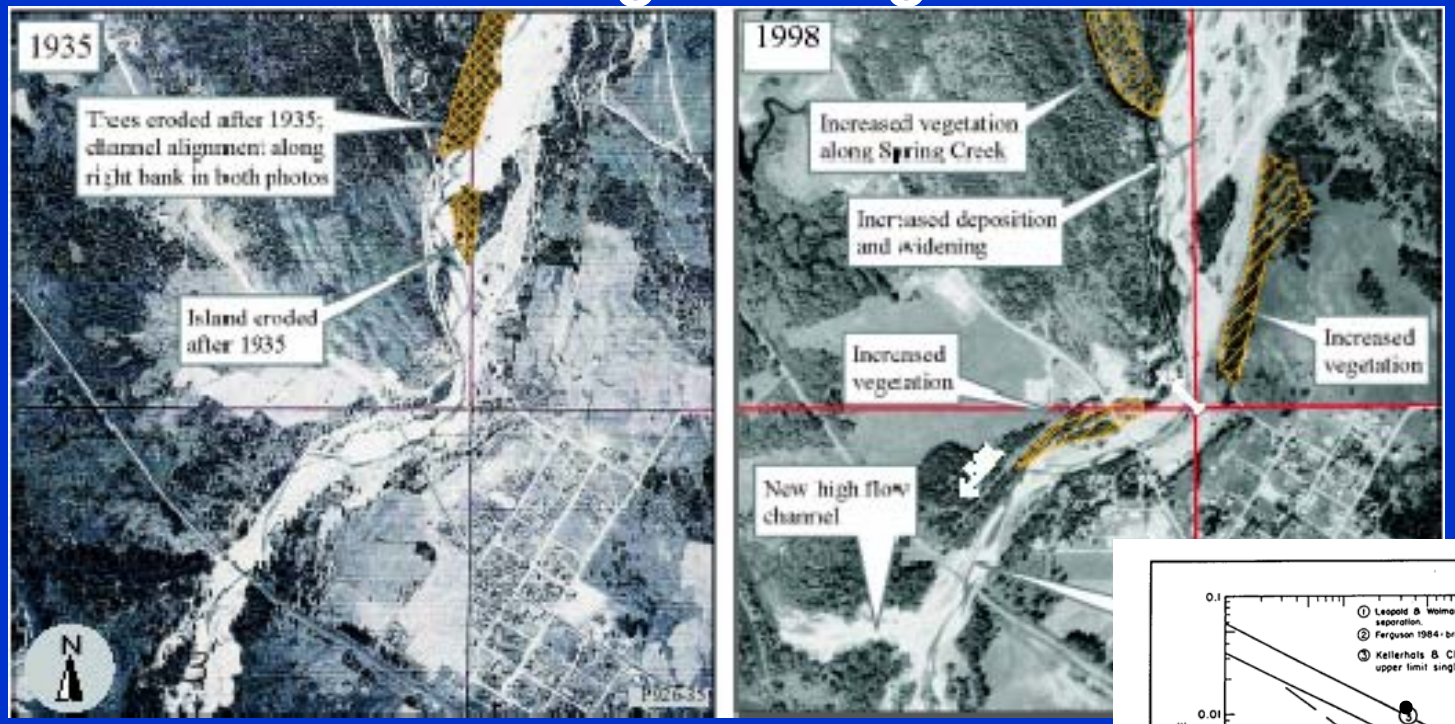




Aerial Photo Interpretation



Long-term Geomorphic Trends in Lower Lightning Creek



The stable form of Lower Lightning Creek tends more toward a braided than a meandering channel based on historic aerial photo interpretation and the current slope-discharge relationship.

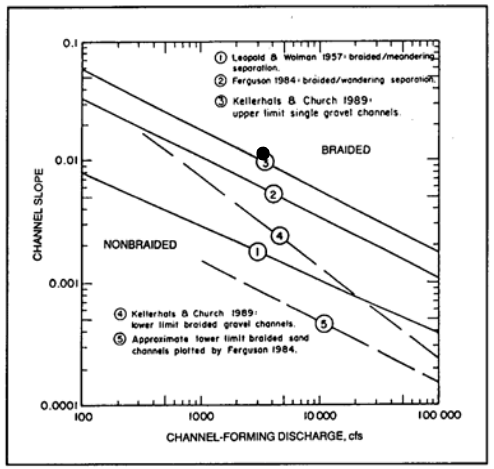


Figure 2-24. Slope-discharge chart distinguishing braided from non-braided channels

Recent Geomorphic Trends in Lower Lightning Creek (USGS Cableway XS)

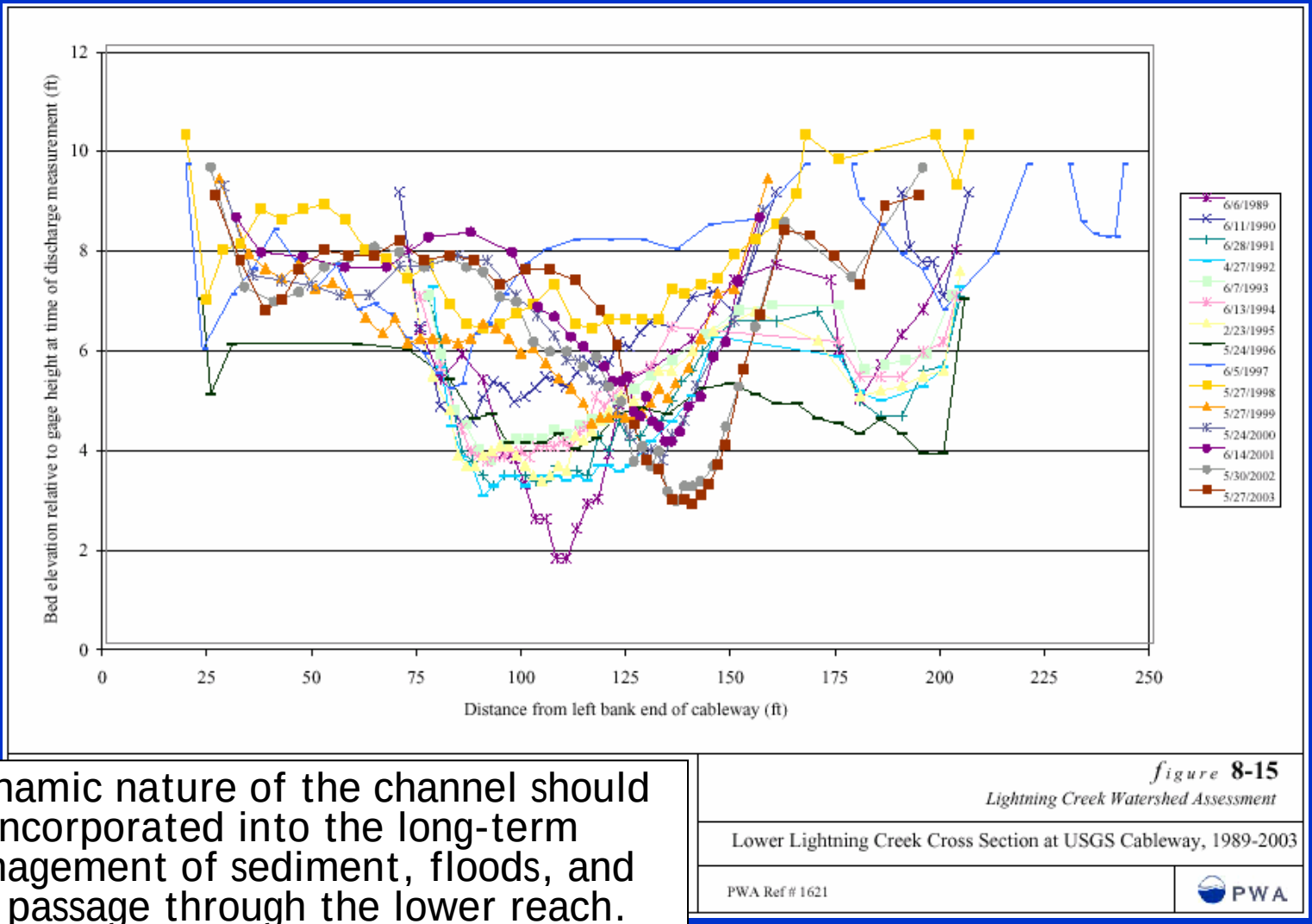


figure **8-15**
Lightning Creek Watershed Assessment

Lower Lightning Creek Cross Section at USGS Cableway, 1989-2003

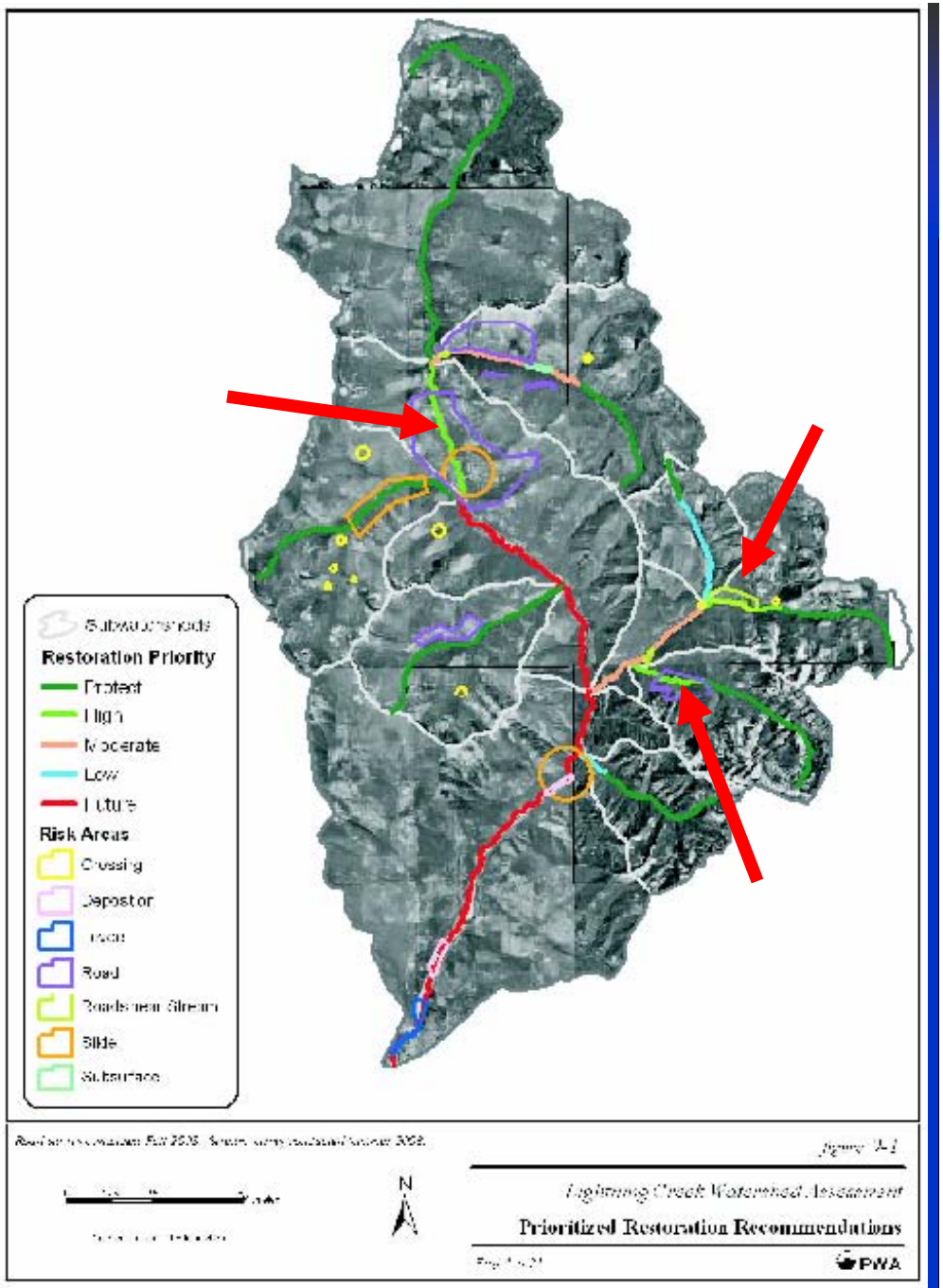
PWA Ref # 1621

PWA

The dynamic nature of the channel should be incorporated into the long-term management of sediment, floods, and fish passage through the lower reach.

Watershed Perspective to Restoration

- Approach with a long-term perspective.
- Protect upper portions of subwatersheds not impacted by logging and above the ROS zone.
- Focus initial restoration efforts on problems impacting slope and channel stability in the source and transport (upper and middle) reaches.



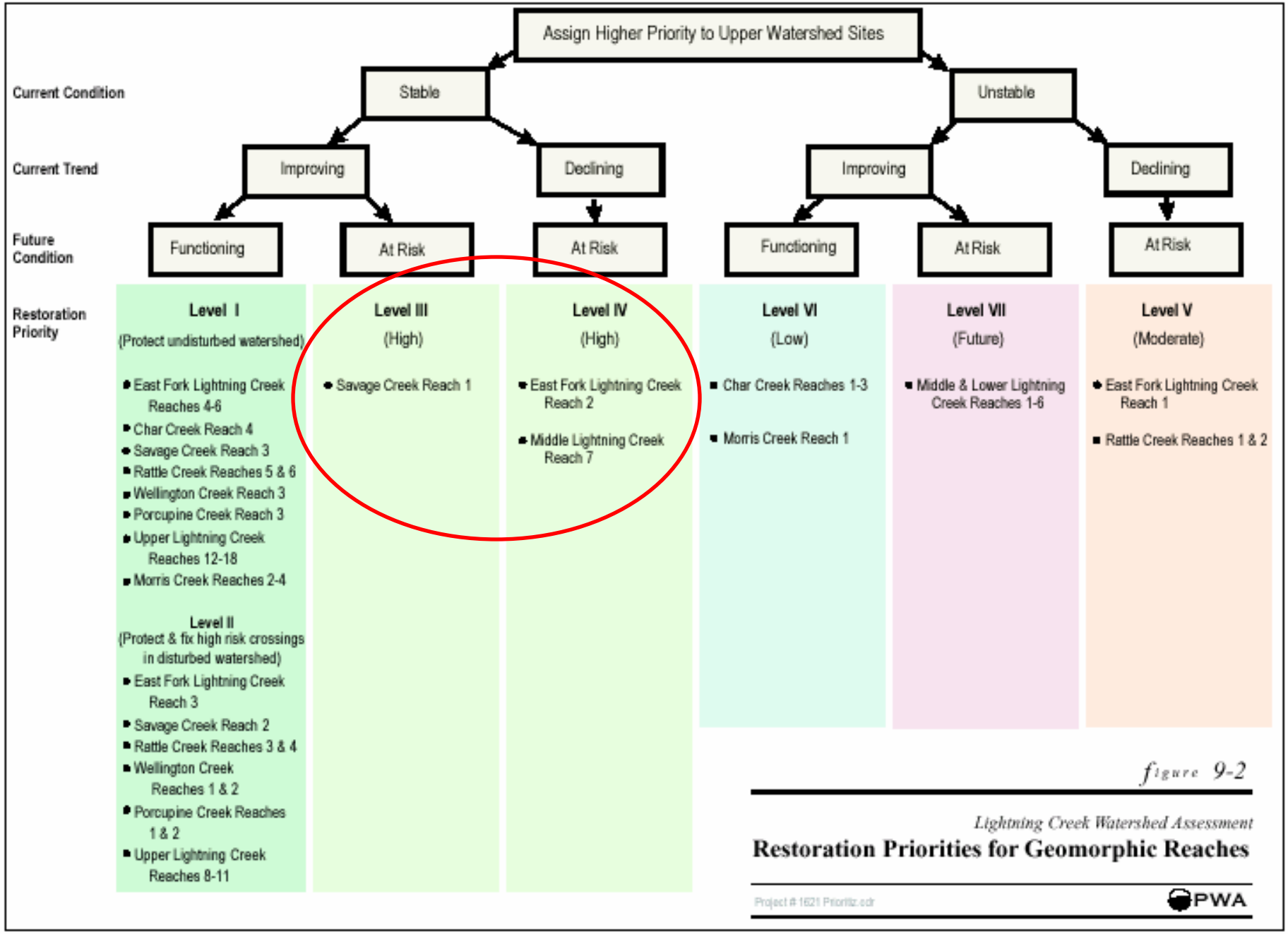


figure 9-2

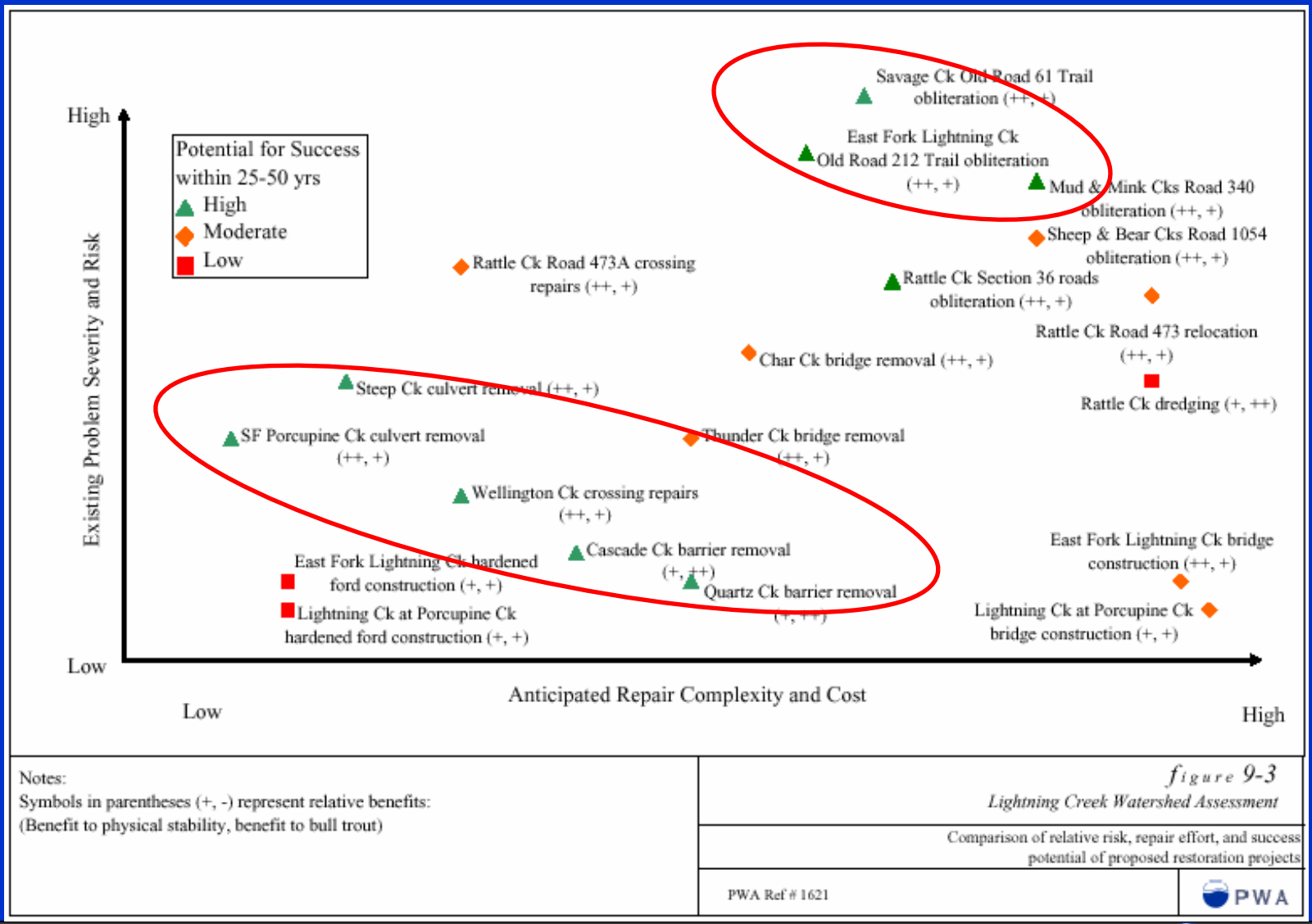
Lightning Creek Watershed Assessment

Restoration Priorities for Geomorphic Reaches

Project # 1621 Priortiz.cdr

PWA

Comparison of Relative Risk, Repair Effort, and Success Potential of Proposed Projects



Notes:
Symbols in parentheses (+, -) represent relative benefits:
(Benefit to physical stability, benefit to bull trout)

figure 9-3
Lightning Creek Watershed Assessment

Comparison of relative risk, repair effort, and success potential of proposed restoration projects

PWA Ref # 1621

PWA

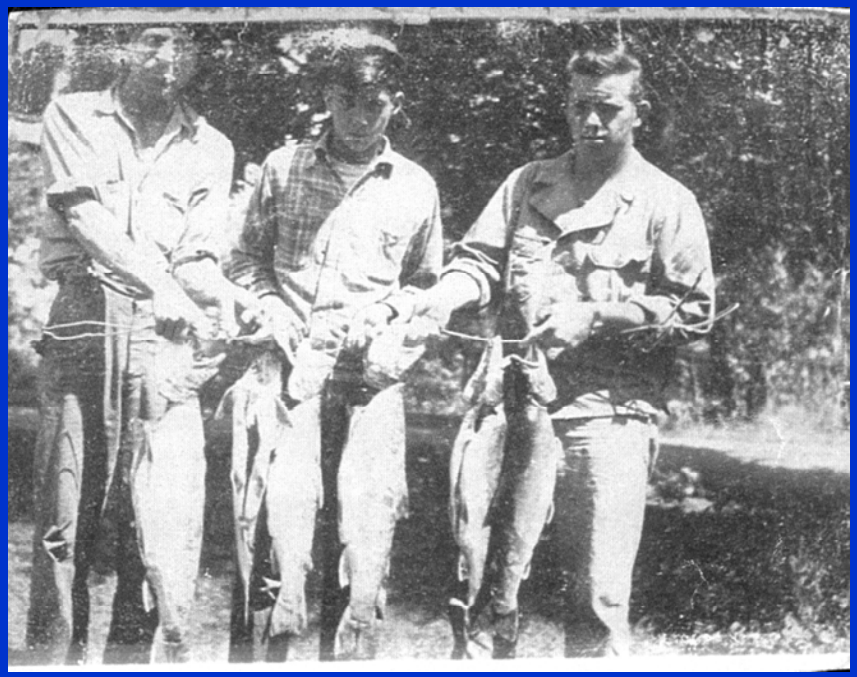
PWA

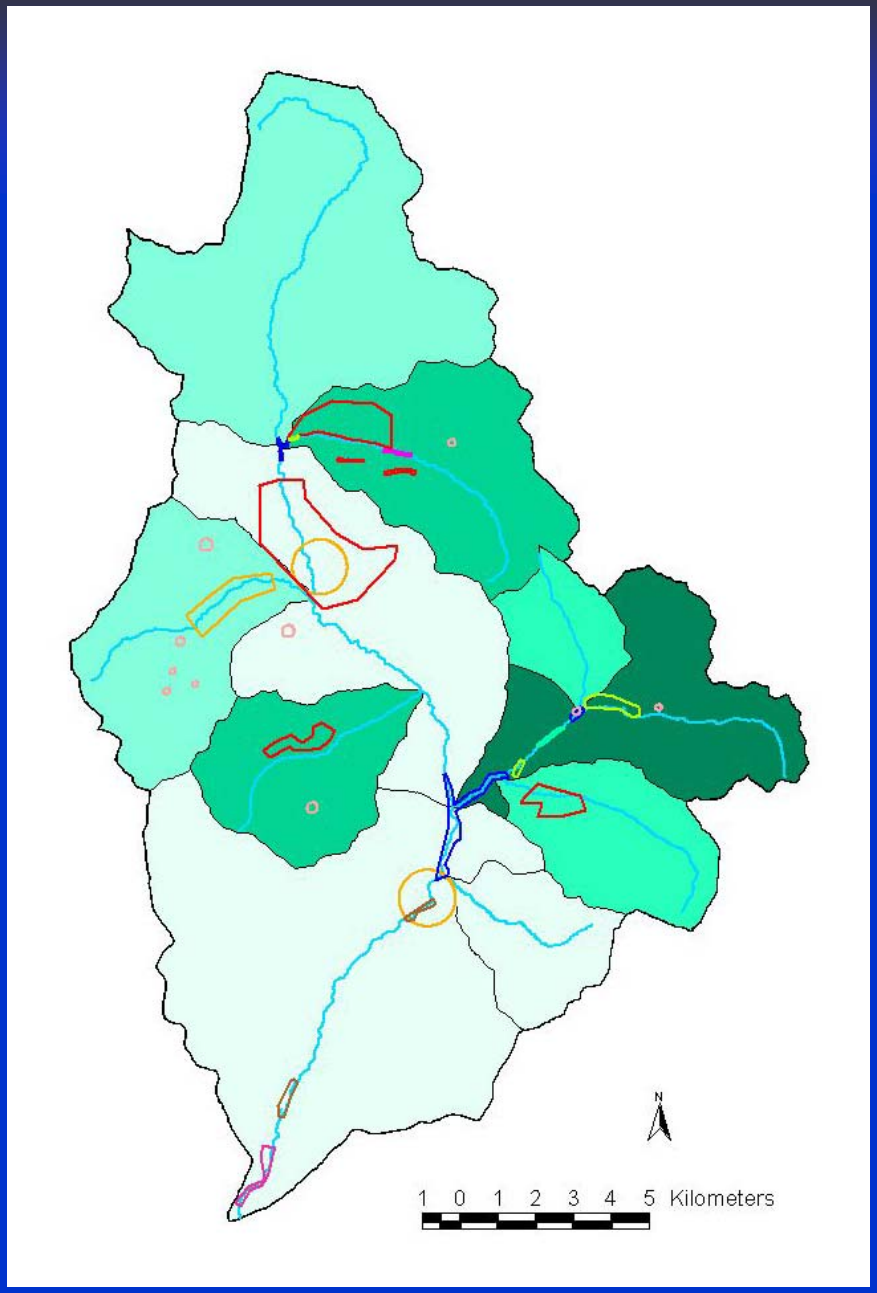
Monitoring Opportunities

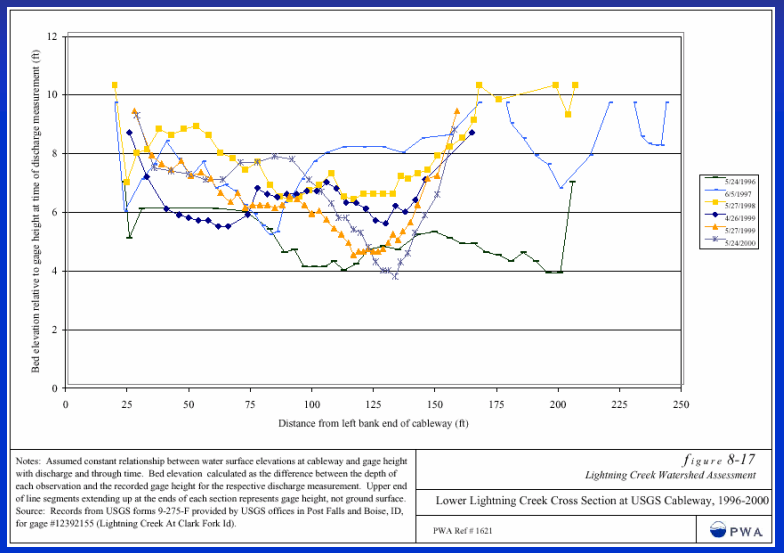
- Include reference, treatment, and control reaches
  - Potential pairs: Savage and Morris, Mud/Mink and Trapper/Silvertip/Section 18, East Fork Lightning and Trestle or West Fork Blue.
- Consider a study design, such as the staircase method, which capitalizes on a sequenced approach to implementing restoration actions.
- Incorporate both physical and biological parameters.
- Emphasize parameters demonstrated to have less variability.

Acknowledgements

- Avista Corporation
- LCTC members
  - Joe DosSantos (Avista Corporation)
  - Chris Downs (IDFG)
  - Shantel Aparicio (DEQ)
  - Juliet Barenti (USFWS)
  - Scott Marshall (IDL)
  - Chris Savage (USFS)
  - Dave Stasney (DEQ)
- Sandy Ball, John Gralow, and Steve Lipscomb (USGS)
- Renai Brogdon (IDFG)
- Ray and Ralph Capaul (sportsmen)
- John Coyle (COE)
- Jason Dunham and Bruce Rieman (USFS RMRS)
- Kevin Davis and Deb Scribner (USFS)
- Jason Scott and Vince Barthells (JUB)
- Scott van Hoff (IDWR)
- Adnan Zahoor and Derek McNamara (IDL)

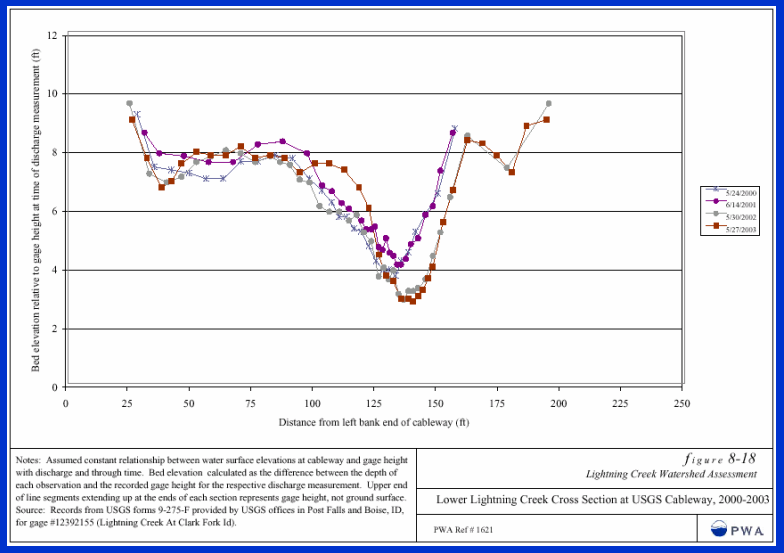






Notes: Assumed constant relationship between water surface elevations at cableway and gage height with discharge and through time. Bed elevation calculated as the difference between the depth of each observation and the recorded gage height for the respective discharge measurement. Upper end of line segments extending up at the ends of each section represents gage height, not ground surface. Source: Records from USGS forms 9-275-F provided by USGS offices in Post Falls and Boise, ID, for gage #12392155 (Lightning Creek At Clark Fork Id).

figure 8-17
Lightning Creek Watershed Assessment
Lower Lightning Creek Cross Section at USGS Cableway, 1996-2000
PWA Ref # 1621
PWA



Notes: Assumed constant relationship between water surface elevations at cableway and gage height with discharge and through time. Bed elevation calculated as the difference between the depth of each observation and the recorded gage height for the respective discharge measurement. Upper end of line segments extending up at the ends of each section represents gage height, not ground surface. Source: Records from USGS forms 9-275-F provided by USGS offices in Post Falls and Boise, ID, for gage #12392155 (Lightning Creek At Clark Fork Id).

figure 8-18
Lightning Creek Watershed Assessment
Lower Lightning Creek Cross Section at USGS Cableway, 2000-2003
PWA Ref # 1621
PWA

Lessons Learned

- Healthy Basins Initiative: Development and implementation of ecosystem based watershed plans that effectively integrate social, economic, and environmental interests within watersheds throughout western North America represents one key element of the recommended initiative.

Symposium goals:

- Highlight the approaches that have been used to develop ecosystem-based watershed plans in various jurisdictions;
  - The LC approach could be applied in other settings, even though USFS was a majority landowner here
- Further identify the challenges associated with the development of watershed plans;
  - Historic data: physical conditions (aerial photos, fire history, landslide history), land management history (cut locations, volumes, techniques), biological conditions (fish distribution, etc)
  - Describing change that has occurred is difficult without historic data
  - Funding – requires a significant effort (office, field, office) to obtain a quality and useable product (GIS level analysis is OK (disparate GIS layers) but field time is critical if a real understanding is desired; must work at multiple spatial scales to describe current conditions and must work at multiple temporal scales if trying to describe change thru time/departure from natural conditions
- Identify the challenges associated with the implementation of such plans; and,
  - Changes in agency personnel
  - Support from all stakeholders
  - Lack of funding
- Discuss the strategies that can be used to overcome these barriers and move toward ecosystem-based watershed management.
  - Keep the focus at the watershed, not reach, scale
  - Standardize GIS DB management across agencies
  - Standardize field protocols
  - Prioritize funding for planning and implementation
  - Require and fund monitoring of response to restoration activities